

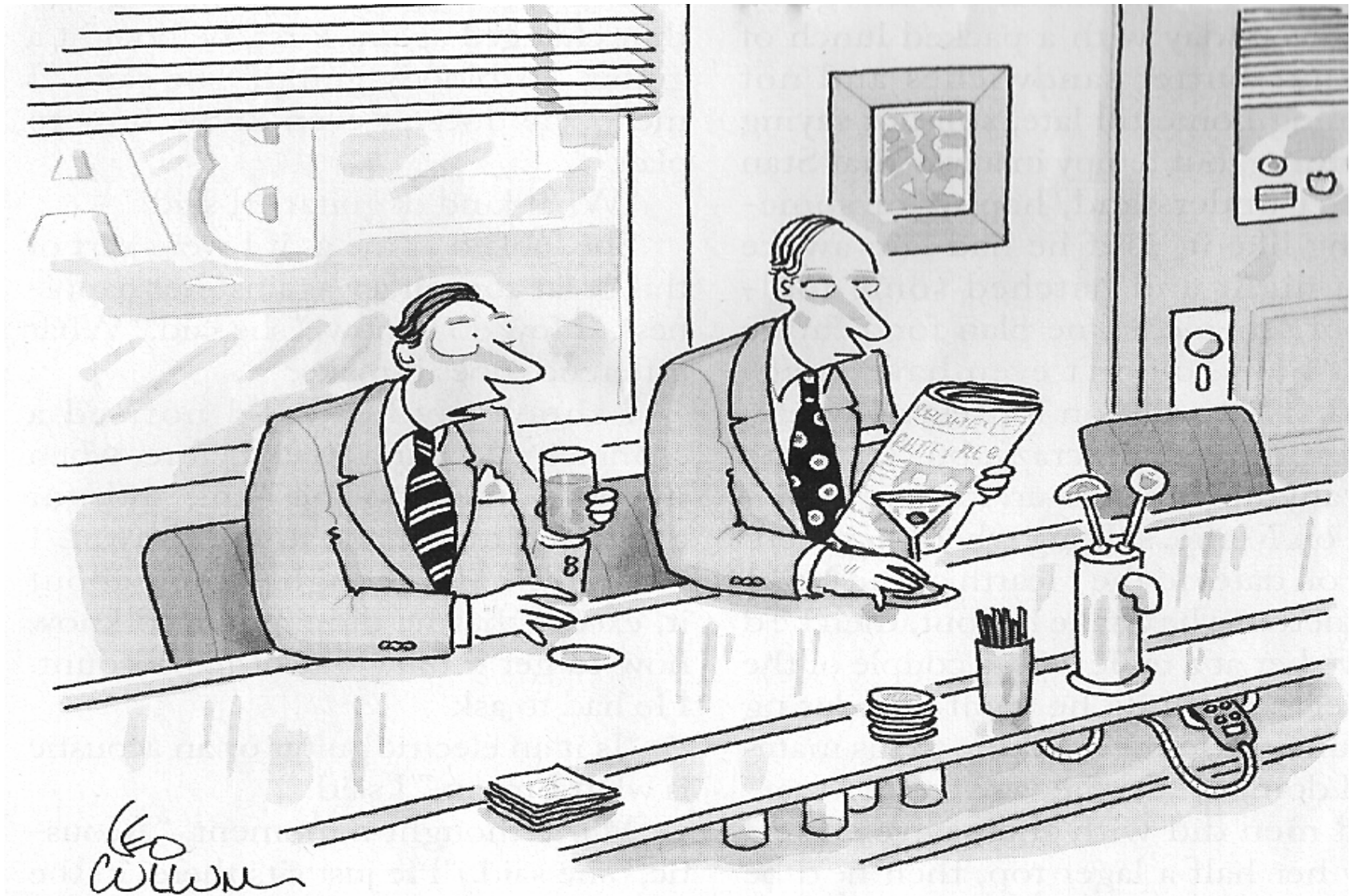
Innovations in Annuities

Eytan Sheshinski

IFID Conference on Retirement Income Analytics

Fields Institute, Toronto

November 25, 2009



"Every day I ask myself, 'Am I embezzling enough for retirement?'"

- Despite the superior nature of annuities as insurance against longevity risks, most retired households have historically shown relatively little interest in voluntary annuitization of their wealth.

- Various factors have been cited as potential explanations for this “annuity puzzle”.

Mandatory, publicly supplied Social Security (SS) benefits, employer run pension plans and 401K schemes provide the basis of retirement incomes. Since SS provides an average Replacement Rate of 38 percent and the other plans have low caps, this should still leave a substantial demand for private annuities, particularly by medium and high income households.

- A **Bequest motive** is often cited as a reason for partial annuitization. Since the most efficient instrument to provide predetermined bequests is **life insurance**, rational planning should lead to annuitization of the bulk of gross wealth minus life insurance premiums.

Empirical evidence starkly contradicts this theoretical prediction.

- We shall comment below on the popularity of annuities which provide a bequest option (e.g. **“Ten Year Certain Annuities”**), whose holding seems inferior to a portfolio of regular (single or joint) annuities and a life insurance policy.

We shall focus on three potential reasons for the “Annuity Puzzle”:

- **Illiquidity of Annuities (lack of residual markets)**

In a recent Watson-Wyatt UK survey (Gardner and Wadsworth, 2004), half the individuals in the sample stated that, given the option, they would never annuitize. This attitude was independent of specific annuity terms and prices. By far, the dominant reason given for the reluctance to annuitize was a **preference for flexibility**.

- This was interpreted as the inability to short-sell (or borrow against) early purchased annuities when personal circumstances make such a sale desirable.

- A preference for selling annuities arises typically upon the realization of information about longevity (disability), income and various other family circumstances.
- While “residual annuity markets” are hardly observed, there does not seem to be any **inherent** reason why such markets cannot become more active. Of course, the equilibrium sale prices will reflect the (weighted) profile , longevity, age and other characteristics of the sellers.

- Economic theory has shown that in the presence of uninsurable risks (in addition to uncertainty about longevity), residual annuity markets have a significant welfare enhancing potential.

- Uncertain health expenses have recently gained particular attention (Pang and Warshawsky, 2008). The literature has thus far yielded inconclusive findings about their effect on the demand for annuities. Some (Turra and Mitchell, 2008; Sinclair and Smetters, 2004) find that uninsured health expenses and their correlation with life expectancy at the age of annuity selection upon retirement reduce the attractiveness of annuities. Davidoff, Brown and Diamond (2005), on the other hand, show that uncertain health expenses, if occurring in late life, may actually increase the demand for annuities.

- Quoting Zvi Bodie (2003):

“... Retired people do not voluntarily annuitize much of their wealth. One reason may be that they believe they need to hold on to assets in case they need nursing home care. Annuities, once bought, tend to be illiquid...”

- Uncertainty about uninsured health expenses generally leads to precautionary savings. As this uncertainty is essentially an addition of risk, rational individuals will shift their portfolio from risky equities to less risky bonds to maintain their overall risk exposure. We shall suggest possibilities to make annuities more complementary and, to a degree, a supportive hedge against health spending risks.

We propose that a **Life Care Annuity**, an integration of life annuity with long term care insurance (payouts increasing with health spending) can provide such hedge and will attract significant demand.

- The integration of annuities and health care expenditures should be particularly appealing to high income groups because they have a higher probability of living to very advanced ages and tend to face larger out-of-pocket health expenses.

Liquidity needs of these groups implies that for them the absence of residual annuities markets is particularly binding, reflected in low demands for annuities which could potentially be much larger.

- Out-of-pocket health care expenses include payments for insurance premiums, nursing home care, hospital, doctors, prescriptions and outpatient care. These expenses rise quickly with age and income (Pang and Warshawsky, 2008). Average out-of-pocket health expenses are below \$4,000 at age 60 and increase to \$40,000 at age 100 for the eighth decile, to \$15,000 for the fifth decile and to around \$5,000 for the second decile. These figures reflect that the above expenses are to a large extent a choice made by households (the existence of Medicaid explains the lower expenses of low income households).

- Private annuity markets are characterized by **adverse-selection**. Insurance firms have a limited ability to identify customers by their '**risk-class**'. Hence, annuities are sold at the **same price** to customers with highly varied longevities. This leads individuals with higher longevities to purchase, other things equal, relatively more annuities, thereby raising the equilibrium annuity price above the price based on the **average mortality** of the population.

- The separation of the population into risk-classes identified by differential longevities becomes more pronounced with age, as information about health, disability and occupational circumstances unfolds. Consequently, residual annuity markets frequented by older customers are more susceptible to **adverse-selection**, compared to annuity purchases in early ages. When young, individuals can purchase annuities at a price which closely reflects the population's mortality rates, but the price of annuities in residual markets will be higher due to adverse-selection.

- In order to make annuities less susceptible to adverse-selection and to accommodate liquidity needs due to out-of-pocket health care expenses we put forward three suggestions, all with the objective of making annuities a more flexible and attractive financial asset.

Refundable Annuities

- We propose a new class of annuities, each carrying a guaranteed commitment by the issuer to refund the annuity, when presented by the holder, at a (pre) specified price. We call these (guaranteed) refundable annuities.

- It can be demonstrated that a portfolio of refundable annuities with varying refund prices significantly enhances individuals' welfare and increases the demand for annuities in early ages.

Individuals who wish to sell some of the early purchased annuities, will sell refundable annuities in a decreasing order, starting with those that have the highest refund price and sliding down. A diversified portfolio of refundable annuities provides additional flexibility to sellers compared to a market with one resale price.

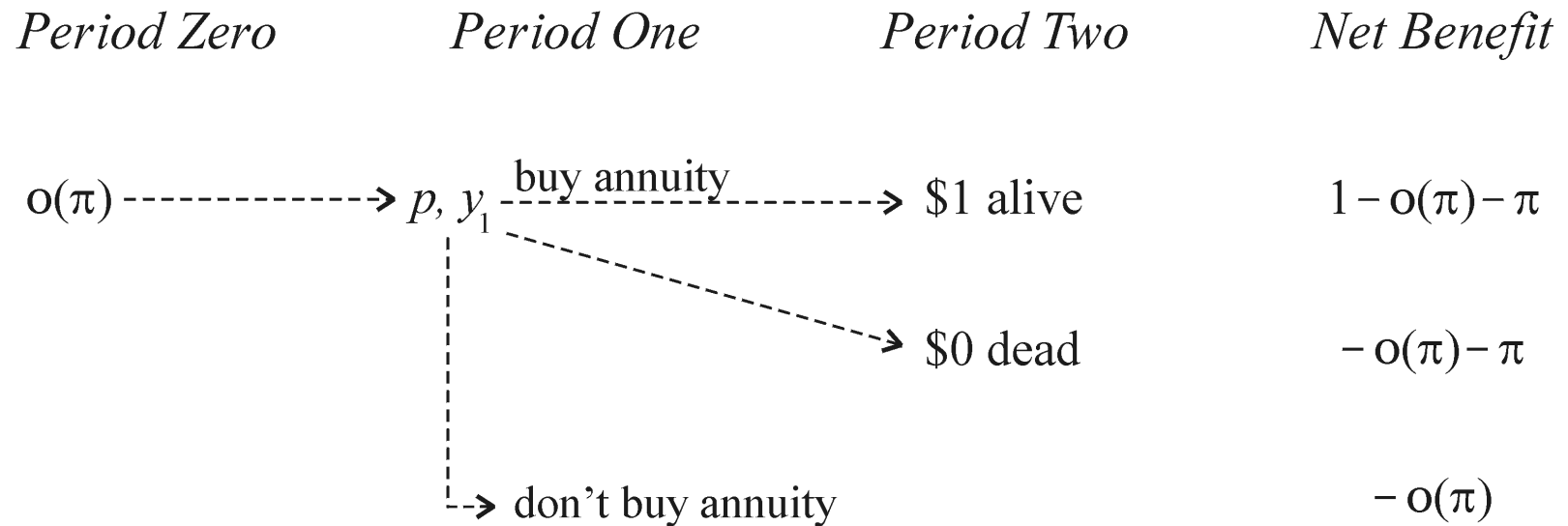
- **Equivalence of Refundable Annuities and Annuity Options**

Refundable annuities are equivalent to options to purchase annuities at a later date for a predetermined price.

For illustration, consider individuals who live for two or three periods. All individuals are alike in period zero. At the beginning of period one they receive information about their probability to survive to period two and about their income.

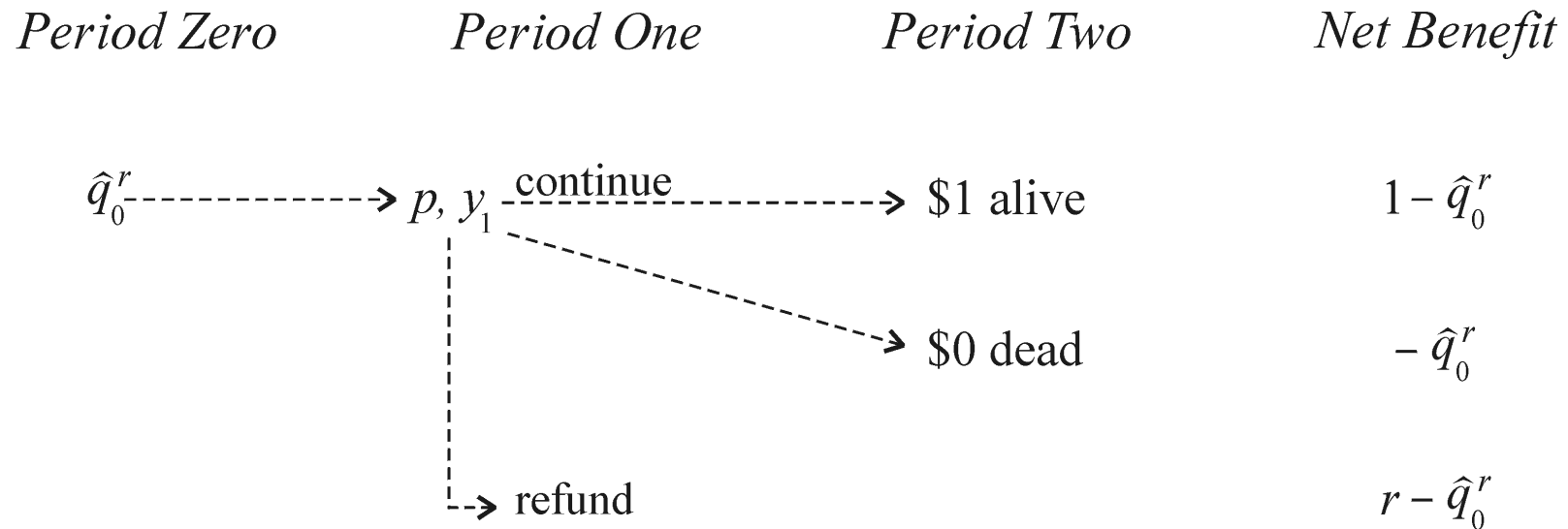
Each annuity pays \$1 in period two if alive. Denote by $0(\pi)$ the price of an option that, if exercised, entitles the holder to purchase in period one an annuity at a price of π . On a time scale, the scheme is as follows:

Annuity Options



The comparable scheme for refundable annuities is:

Refundable Annuities



**It is seen that when $\hat{q}_0^r = 0(\pi) + \pi$ and $r = \pi$
 (and hence, $0(\pi) = \hat{q}_0^r - r$) these two schemes
 are equivalent.**

- The flexibility offered by holding a portfolio of annuity options may also be advantageous due to ‘behavioral’ reasons. A vast economic literature reports on experimental and empirical evidence of individuals’ bounded rationality and shortsightedness (e.g. Rabin (1998) and (1999), Mitchell and Utkus (2004)). Of particular relevance to our case seems to be the plan designed by Thaler and Benartzi (2004), where individuals commit to save for pensions a certain fraction from future **increases in earnings**.

- **Bundling of Annuities with Other Insurance Products (Health Care, Life Insurance)**

Due to asymmetric information (private attributes of customers which cannot be inferred from their actions), annuities are sold at the same price to individuals with different costs to sellers. This leads, as we argued, to adverse-selection, which, in turn, has a negative effect on prices. This is called a **Pooling Equilibrium**.

When there are a number of insurance products, each characterized by asymmetric information and a pooling equilibrium, the **bundling of products whose costs to the sellers are negatively correlated reduces adverse-selection and leads to a robust Pareto dominant, equilibrium.** 'Robust' means that there will be no group of consumers who have an interest to purchase the bundled products in **stand-alone** markets.

Examples: annuities and health care or life insurance.

Better health is associated with higher longevity and, consequently, higher annuity cost. On the other hand, better health reduces demand for medical care.

Consequently, bundles of these products may be more cost effective than selling these products in stand-alone markets.

- To address the out-of-pocket health expenses of the elderly, a new class of annuities (“Care-Annuities”) may allow, with certain stipulations, trade-offs between payouts to annuitants and partial coverage of such expenses. Customers may be allowed to choose between products which offer different levels of such tradeoff. A range of substitution possibilities should be particularly appealing to medium and high income individuals.

- **Annuities with a Bequest Option**

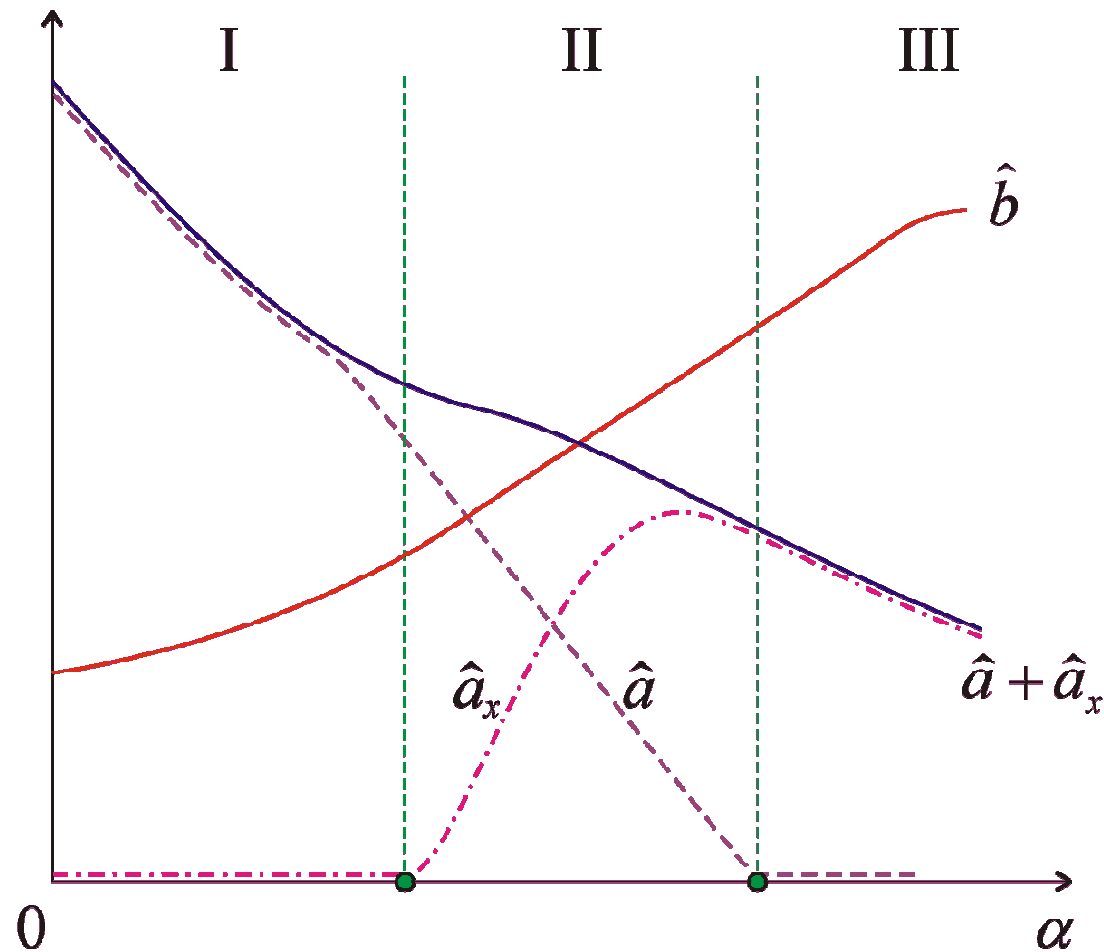
Regular annuities provide payment for the duration of an owner's lifetime. **Period – Certain annuities** provide additional payment after death to a beneficiary, provided the insured dies within a certain period (10-years or 20-years) after payouts start.

It has been argued (e.g. Davidoff, Brown, Diamond, 2005) that the bequest option offered by the latter is dominated by regular annuities and life insurance. This is correct in a **full-information** competitive annuity market. However, in a **pooling-equilibrium** with **self-selection**, it can be demonstrated that both types of annuities will typically be held (by individuals with different longevities).

- An important Conclusion emerges from this observation: **adverse selection** is reflected not only in the **amounts** of insurance purchased but by individuals selecting **different insurance products**. This conclusion seems to be supported by recent empirical work about the UK annuity market (Finkelstein – Poterba, 2004).

- The detailed analysis (Sheshinski, 2008) is displayed in the following diagram. The parameter α represents longevity. Higher α stands for lower longevity; $a(x)$
 \hat{a}_x are the equilibrium holdings of Period-Certain annuities;
 \hat{a} are the equilibrium holdings of regular annuities and b is the level of life insurance .

A pooling equilibrium has positive holdings of regular annuities, X-annuities and life insurance.



It would be interesting to study (UK data is particularly suitable) the **observed** relation between the type of annuities held, life insurance and longevity of the holders.

If the data does not support the theory we can follow current fashion explaining that the failure is due to “boundedly rational behavior” ...